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(54) **A method for making bread, a composition for use in the method, and a process for preparing the composition.**

(57) A finely divided composition prepared by heating and extrusion of a mixture of a cereal flour or meal or starch on the one hand and a vegetable fibrous material on the other hand is included in the mixture from which bread dough for rye bread or coarse bread types based on rye or wheat meal combined with other cereal meals or flours is made. The composition exerts the same effect as the precooked starch used in the known art, but results in improved sliceability, improved taste and a more pleasant colour, together with a better gas retention and a better machinability. A preferred composition is made from about 40 % of rye meal and about 60 % of wheat bran. The extrusion is performed under conditions under which a certain degree of precooking of the starch or the cereal component of the composition will take place, preferably at such a temperature that a certain degree of roasting of the product will take place, such as a temperature of 150–180°C. The extrusion results in expanded, relatively crisp granules, which are then comminuted in a hammer mill or disc mill into the final composition.

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A METHOD FOR MAKING BREAD, A COMPOSITION FOR USE IN THE METHOD, AND A PROCESS FOR PREPARING THE COMPOSITION

In the preparation of rye bread, it has been customary to add, during the dough preparation, a small amount of precooked rye or maize starch. This addition improves the dough properties in that it facilitates the handling of the dough and controls or regulates the water absorption so that minor excesses or deficiencies in the water addition will not to any major extent influence the consistency of the dough. Also the sliceability of the final loaf or bread is improved by the addition of the precooked starch which confers a higher elasticity to the bread and thereby also gives an impression of "freshness".

The precooked starch may be added as such, but in most industrial preparation of rye bread, the precooked starch is added as a dry powder because it is more easy to dose.

In certain cases, precooked starch is also used in the same manner in the preparation of coarse bread types based on wheat meal.

It has now been found that a combination of a starch and a fibrous material, when treated in a particular manner, exerts the same effect as the precooked starch, but, in addition, confers a number of additional and surprising improvements such as a better gas retention in the fermenting dough, thus reducing the necessary amount of yeast or other microorganism involved in the rising of the bread, a better colouring effect on the dough, thus rendering the addition of other colourants superfluous, a better machinability, and an improved sliceability compared with bread made with precooked starch, together with an improvement of the taste.

Thus, the invention relates to a method of manufacturing rye bread or bread types based on rye or wheat meal combined with other cereal meals or flours, the method comprising including, in the mixture from which the bread dough is made, a finely divided composition prepared by heating and extrusion of a mixture of a cereal flour or meal or starch on the one hand and a vegetable fibrous material on the other hand.

- Examples of cereal flours or meals or starches which may be used in the mixture from which the composition is made are rye flour, rye meal, wheat flour, wheat meal or wheat starch, maize flour, maize meal or maize starch. It is often preferred to use rye meal when the composition is to be used for preparing rye bread or bread based on rye meal combined with other cereal meals or flours. Examples of vegetable fibrous materials which may be used in the mixture for making the composition are brans such as wheat bran, rye bran, pea bran and soybean bran, and fibers such as sugar beet fibers.
- 10 The weight ratio between the flour or meal or starch and the fibrous material is normally in the range of about 30-50% of the flour or meal or starch to about 70-50% of the fibrous material, such as, e.g., about 40% of the flour or meal and about 60% of the bran.
- 15 A preferred composition is a composition made from rye meal and wheat bran, such as, e.g., about 30-50% of rye meal, preferably about 40% of rye meal and 50-70% of wheat bran, such as about 60% of wheat bran.
- 20 By being subjected to heating and extrusion in an extruder, the mixture becomes "expanded", that is, is converted into air-filled, hollow granules. The conditions in the extruder with respect to temperature and moisture content of the mixture in the extruder should be so selected that a certain degree of precooking of the starch of the cereal component will take place. Normally, this means that the temperature should be at least 65°C, preferably at least 75°C. The normal natural moisture content of the meal or starch and the fibrous material (about 12-14% by weight) is usually sufficient. If necessary, a small amount of water, such as 2-4%, calculated on the weight of the mixture supplied to the extruder, may be added. Preferably, the temperature during the extrusion process is kept at such an elevated level that a certain degree of "roasting" of the product will take place, typically a temperature of about 140-190°C, such as 150-180°C, as this roasting contributes to the development of the above-mentioned good taste and colouring properties.
- 30

The product obtained from the extruder consists of expanded granules of a relatively crisp character. These granules may, in principle, be added as such to the dough and become disintegrated during the mixing of the dough (which is within the scope of the invention), but it is generally preferred to comminute the granules in a mill such as a hammer mill or a disc mill.

The invention also relates to a bread-improving composition as described above, that is, a composition prepared by heating an extrusion of a mixture of a cereal flour or meal or starch on the one hand and a vegetable fibrous material on the other hand and optionally disintegrating the extruded product, and to the method for its preparation.

Preferably, the resulting powder is included in bread mixes in a similar manner as the powdery precooked starch incorporated in the known art. The handling of the dough and the baking of the bread is performed in the normal manner. In comparison with similar bread made with precooked starch, the bread made using the above-described composition has a better taste and a better sliceability. The bread made using the composition also has a more pleasant colour than the colour obtained in the known art where coarse wheat-based, rye-containing bread is coloured by adding roasted malt (which gives a less pleasant greyish black colour, whereas the product of the invention confers a brownish and preferred colour to the bread).

In addition, bread made with the composition has the advantage, from a dietetic point of view, that it has an added fiber content derived from the bran or fibers used in the preparation of the composition.

While normal bran will develop an unpleasant taste after a relatively short storage period, the composition of the invention does not have this tendency, apparently because the constituents which confer an unpleasant taste to bran are removed or decomposed during the extrusion process. This means that the composition of the invention can be stored for years without deterioration.

The composition is normally added in an amount of 1-12% by weight, calculated on the total dry bread mix constituents, often in an amount of 1-6% by weight, calculated on the same basis.

5 In rye bread, the composition is often added in an amount of about 2% by weight, calculated on the rye meal or rye flour. In coarse wheat bread, the amount added may be somewhat higher, typically in the range of about 2-6%, typically about 4%, by weight, calculated on the total dry bread mix constituents. Also in coarse wheat bread, the same positive effects as mentioned above are obtained by the use of  
10 the composition, i.e. better sliceability, less drying out during storage and a better taste, in addition to the above-mentioned better colour. When used for preparing coarse wheat bread, the composition is often preferably a composition made from wheat meal as the cereal constituent.

#### 15 EXAMPLE 1

To an extruder of the type BC 45 supplied by Creusot-Loire, France, and comprising a double screw which rotates at a rotational speed of 180 r.p.m., and two nozzles of a diameter of 2 mm, part of the double screw length being cooled by means of a water jacket and the  
20 part of the double screw being adjacent to the nozzles being heated by means of an induction heating jacket, a mixture of 40% of rye meal and 60% of wheat bran was supplied in an amount of 35 kg/hour. The temperature in the screw section was kept at 180°C. The extrudate consisted of expanded (air-filled, hollow) crisp granules.

25 The granules were comminuted into a fine powdery product in a disc mill.

Rye bread was baked in the following manner:

1 kg rye meal was admixed with 20 g salt, 300 g sour dough, about 600 g water and 20 g of the comminuted product prepared as de-  
30 scribed above. The constituents were mixed and the dough was al-

lowed to rise at a temperature of 28-30°C for one hour, whereafter it was put into a baking tin and was allowed to rise for an additional 30 minutes and was then baked for 1 hour in an oven which had been preheated to 230°C and in which the temperature gradually decreased to 180°C during the baking time.

The quality of the resulting rye bread was evaluated by an experienced panel by comparison with rye bread prepared in the same manner, but with 20 g precooked starch instead of the composition made as described above. The rye bread made with the composition was found to have an improved sliceability, a more pleasant colour and an improved taste, compared to the same qualities of the rye bread made using precooked starch.

In a similar manner, a light rye bread type may be made from about 70 parts by weight of rye meal, 30 parts by weight of wheat flour, 2 parts by weight of salt, 15-20 parts by weight of sour dough or 1 part of dough acidifying agent (e.g., a mixture of 4.5 parts by weight of citric acid, 4.5 parts by weight of malic acid, and 1 part by weight of calcium acetate), about 60 parts by weight of water and 2 parts by weight of the comminuted composition prepared as described above.

## EXAMPLE 2

To an extruder of the same type as described in Example 1, but rotating at a rotational speed of 80 r.p.m. and with 2 nozzles of a diameter of 4 mm, a mixture of 30% by weight of wheat whole meal and 70% of wheat bran was supplied in an amount of 30 kg/hour. The temperature in the screw section of the extruder was kept at 150°C. The extrudate consisted of expanded crisp granules which were comminuted into a fine powdery product in a disc mill.

High fiber bread may be made in the following manner:

50 parts by weight of rye meal is admixed with 30 parts by weight of wheat flour, 6 parts by weight of dietetic fibrous material (soy fibers or soy bran), about 60 parts by weight of water, 1 part by weight of dough acidifying agent, 5 parts by weight of bakers' yeast, and 10 parts by weight of the comminuted product prepared as described above; baking temperature 210-220°C.

### EXAMPLE 3

To an extruder of the same type as described in Example 1, but rotating at a rotational speed of 180 r.p.m. and with 2 nozzles of a diameter of 4 mm, a mixture of 40% by weight of corn grutting and 60% of wheat bran was supplied in an amount of 30 kg/hour. The temperature in the screw section of the extruder was kept at 150°C. The extrudate consisted of expanded crisp granules which were comminuted into a fine powdery product in a disc mill. This product is well suited for preparing rye bread in the same manner as described in Example 1.

## CLAIMS

1. A method for manufacturing rye bread or bread types based on rye or wheat meal combined with other cereal meals or flours, comprising including, in the mixture from which the bread dough is made, a finely divided composition prepared by heating and extrusion of a mixture of a cereal flour or meal or starch on the one hand and a vegetable fibrous material on the other hand.
2. A method according to claim 1 wherein the weight ratio between the flour or meal and the fibrous material in the mixture from which the composition is made is in the range of about 30-50%, in particular about 40%, by weight of the flour or meal to about 70-50%, in particular about 60%, by weight of the fibrous material.
3. A method according to claim 2 wherein the meal is rye meal and the bran is a bran, in particular wheat bran.
4. A method according to any of the preceding claims wherein the composition is included in an amount of 1-12% by weight, in particular 1-6% by weight, calculated on the total dry bread mix constituents.
5. A method according to claim 4 wherein the bread is a rye bread, and the composition is added in an amount of about 2% by weight, calculated on the rye meal.
6. A method according to claim 4 wherein the bread is coarse wheat bread, and the composition is added in an amount in the range of about 2-6%, such as about 4%, calculated on the total dry bread mix constituents.
7. A bread-improving composition prepared by heating and extrusion of a mixture of a cereal flour or meal or starch on the one hand and a vegetable fibrous material on the other hand and optionally disintegrating the extruded product.



8. A composition according to claim 7 wherein the weight ratio between the flour or meal and the fibrous material is in the range of about 30-50%, in particular about 40%, by weight of the flour or meal to about 70-50%, in particular about 60%, by weight of the fibrous material.

9. A composition according to claim 8 wherein the meal is rye meal and the fibrous material is wheat bran.

10. A method for preparing a bread-improving composition, comprising subjecting a mixture of a cereal flour or meal or starch on the one hand and a vegetable fibrous material on the other hand to heating and extrusion and optionally disintegrating the extruded product.

11. A method according to claim 10 in which the weight ratio between the flour or meal and the fibrous material is in the range of about 30-50%, in particular about 40%, by weight of the flour or meal to about 70-50%, in particular about 60%, by weight of the fibrous material.

12. A method according to claim 10 or 11 in which the temperature of the mixture subjected to extrusion is at least 65°C, preferably at least 75°C, in particular in the range of 140-190°C, such as 150-180°C.

13. A method according to any of claims 10-12 in which the meal is rye meal and the fibrous material is wheat bran.

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# EUROPEAN SEARCH REPORT

Application number

EP 85101801.0

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-1 189 130 (KELLOGG TOASTED CORN FLAKE COMPANY) ---	1-13	A 21 D 2/36
A	DE-B1-2 622 748 (MÜHLE RÜNINGEN AG)  S SE B 7705815-4 ---	1-3	
A	CA-A-1 075 968 (THE GRIFFITH LABORATORIES) ---	1-3	
P	EPO-A2-124 996 (NABISCO BRANDS INC.) 14 November 1984 ---	1-3	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			A 21 D
The present search report has been drawn up for all claims			
Place of search STOCKHOLM		Date of completion of the search 24-04-1985	Examiner BOIJE JANSON K
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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